Incorporating Making into University Courses for Teachers

Practices from Three CSU Campuses: CSUS, SDSU, and SSU
Introduction to the Panelists

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Overview of Making and Makerspaces in Education

Making vs. Design Thinking

A Maker Mindset

Why Making in PK-12 education?

Our Programs

Affordances and Constraints
Making in Education

* Making is viewed as the democratization of STEM and project-based learning because makers transform from novices to experts while conceiving, designing, and making what matters to them (Rosenfeld Halverson & Sheridan, 2017)

* Design Thinking = One Form of Making in Formal Spaces
A Maker Mindset

1. a sense of curiosity
2. an interdisciplinary approach to challenges
3. social-emotional competence through play
4. a disposition to share and collaborate
5. a growth mindset
6. resilience in the face of frustration (Regalla, 2016).
Why Making in Education?

- Alignment with NGSS and Common Core State Standards
- Develop 21st Century Skills, including creativity, group work, problem-solving
- Cultivate a maker mindset
- Engage students in learning and having fun during learning
Sacramento State University
Design Thinking Unit Plan
Ask, Solve, Reflect

**ASK**
- Mini-Ethnographic Study
- Empathy Lesson
- Identify a Problem Rooted in the Students’ Context

**SOLVE**
- Develop Content Knowledge
- Connect to Social Justice Domains and Standards (Tolerance.org)
- Facilitate Culturally Sustaining Projects using 21st Century Tools

**REFLECT**
- Reflection Lesson
- Formative Assessment
- Praxis
Ask

- What were the key takeaways from your Mini-Ethnographic Study?
- Help your students build empathy about a problem by developing an empathy lesson
- Identify a Problem Rooted in the Students’ Context
Consider the problem that you have decided to address. How might you:

- **develop students’ content knowledge**?
- incorporate the Perspectives for a Diverse America SJ Framework?
- develop 21st Century Learning and Innovation Skills?
- facilitate students' creation of culturally sustaining projects?
Reflect on your students’ designs. How has Making supported your students’:

- Learning of 21st Century Skills?
- Your practice as a Culturally Sustaining Pedagogue?
- More positive identity processes?
The program will engage students in a 30-credit program designed to develop critical knowledge of making, the maker movement, and Maker Education.

We will examine the ideas and practices associated with educational reforms that emphasize making as an ethos of interest-driven do-it-yourself (DIY) learning and culture.
Proposed MA Maker Education
MA in Education: Special Programs

California State University, Sacramento

Learning Outcomes

• Provide opportunities for students to engage in creative discovery and problem-solving within and beyond the classroom

• Connect students in the program with mentors and collaborators from the maker community

• Leverage CSUS's new makerspace in curriculum development
Proposed MA Maker Education
MA in Education: Special Programs

California State University, Sacramento

Learning Outcomes

• Provide a foundation in theoretical and practical perspectives on Maker Education

• Critically examine the ethos and tools needed to develop makerspaces

• Cultivate and strengthen students' abilities to develop 21st Century Learning and Innovation skills.
Proposed MA Maker Education

MA in Education: Special Programs

California State University, Sacramento

What are the Course Offerings?

- Maker Theory and Practice
- Project-Based Learning and Assessments for Maker Educators
- Pedagogy for Learning and Innovation
- Educational Research Methods for Technology and Transformation (EDTE 250)
- Practicum in Maker Education
- The Anthropology of Making
- Makerspaces
- Teaching and Learning in a Makerspace
- Portfolio
San Diego State University--Donna Ross
SDSU -- Aztec Science Camp
SDSU Credential Courses

- Science Methods
- Educational Technology (within foundations series)
- Not all cohorts receive same opportunities
SDSU Graduate Course for Teachers

Elective course -- current topics in STEM education -- 3 unit course
SDSU Upcoming Certificate Courses

- Modeled after Sonoma State’s program
- 1 unit 799 courses
- Understand the principles of making
- Learn pedagogical practices for making
- Up to 5 courses (still in negotiation)
- Designed for formal/informal educators, school administrators, and library staff
SSU Preparing Teachers
SSU Workshop
SSU Course

Robots with Different Designs

Lil’ Breezy with Different Designs
SSU Course
SSU Maker Educator Certificate

As a result of completing the Maker Educator Certificate Program, participants will...

- Understand the core values and principles of Making
- Learn pedagogical practices for empowering learners to explore Making and a Maker mindset in a learning environment
- Design an action plan for implementing Maker activities in a learning environment
- Begin to consider ways to integrate Making in the classroom
- Begin to align Maker projects with CCSS and NGSS
- Become part of a Maker network
- Receive mentorship from local Maker educators, including SSU faculty and K-12 maker teachers
Addressing Challenges to Incorporating Making into Teacher Education

- Find time in the teacher preparation programs
- Need more faculty involvement
- Need models of how Making fits with curricula and standards
- Attitude that we need everything to get started
- Awareness and Maker Mindset
Equity in Making and Makerspaces

- Prototypes promoted in the MAKE magazine and maker community
- Gender issues in making and STEM education
- Making for non-dominant youth in under-resourced schools and communities
- Solving problems that are personally and community relevant
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thank you so much